

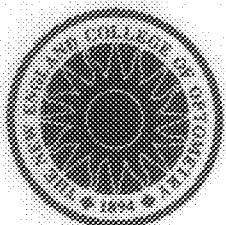
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In the matter of:
Closed Captioning and
Video Description of Video Programming

Comments on Closed Captioning
Docket No. MM-95-176

MM Docket No. 95-176

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We file these comments on the Docket cited above on 28 February 1997.

We respectfully submit these comments in regard to the technical and quality standards of the transmission mechanisms.

Summary of Comments:

We have performed research at the New England College of Optometry in a series of experiments designed to test the legibility of closed caption text under different reading conditions. The results of this research lead us to conclude that the text and presentation rate now used for closed captioning is too vulnerable to reading errors, which underscores the necessity of finding a better presentation format for captioning. This research directly impacts on the effectiveness of the closed captioning service since hearing-impaired people are known to have a higher incidence of visual, language and reading problems than the general population. As a result, we urge the Commissioners of the FCC to encourage the development of a closed captioning technology that is flexible enough in design for text presentation improvements to be readily incorporated into new broadcast and cable technologies as they emerge. This will ensure that, when a better text is designed, it can be quickly and easily integrated into the system, making the captioning service accessible to the greatest number of hearing-impaired people.

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Expanded Comment Section:

During the past 8 years we have performed several well-controlled studies to demonstrate the legibility of today's closed captions under normal and slightly challenging viewing conditions. We have tested reading legibility for clear and slightly blurred vision of different presentation rates for hearing college graduates, elderly people, and hearing-impaired high school students. This work has been published in professional journals and presented at scientific meetings (references listed at end of comment section).

We have shown that when a television is viewed from a comfortable distance with clear vision at a slow presentation rate (120 words per minute), a literate college graduate can read them without difficulty. However, a small amount of blur deliberately induced by a slightly inaccurate refractive lens correction or an increase in presentation rate can seriously disrupt reading performance. The lens-induced disruption is greatest when captions are presented at a faster rate. Surprisingly, our studies also showed that the reading performance of well-educated, hearing, young adults who had learned English as a second language is especially vulnerable to the adverse effects of speed and blur.

This work emphasizes the importance of choosing closed caption text and presentation rates that are easier to read than the one currently in use. Indeed, the demographics of the audience as well as the various applications of the service itself demand that the text be as legible as possible. In designing a better caption text, there are several factors that must be addressed:

** Vision Problems.*

The most common cause of reduced vision is optical blur, and studies have shown that hearing-impaired people are much more likely to need glasses than the general population and, if they wear glasses, their lenses are often the wrong strength. This may be due in part to the difficulty many hearing-impaired people have communicating with their eye doctors, making it more likely that the eye doctor will write a prescription that is not the best correction for the patient. Along with refractive errors, many pathological conditions that cause hearing impairment also have adverse affects on vision.

Our research clearly demonstrates that the present font and presentation rate make it difficult or impossible for the many hearing-impaired people who have small amounts of visual blur to benefit from captioning.

** The Elderly Population.*

This is the fastest-growing segment of the hearing-impaired population. One in three people develops a hearing impairment by the age of 60 which is severe enough to compromise their ability to understand spoken language, and 80% of the hearing-impaired population is elderly. The aging

process often involves subtle losses in vision and a slowdown in reading rate, especially when attention must be divided with other tasks, such as watching the visual action of a TV show. These changes can compromise their ability to read and enjoy captioned television.

Our research shows that elderly people are able to read captions under a variety of conditions as well as young adults can. But their subjective comments indicated that the captions were presented so rapidly that the visual challenge imposed was so great that they would not use these captions for general entertainment programs.

* *Language and Reading Factors.*

The average deaf person reads at the fourth grade level when graduating from high school. This is probably due to the fact that they have more difficulty learning a language based on sound as well as the fact that deaf people often learn English as a second language.

As mentioned above, our research shows that if college graduates learned English as a second language, their ability to read captions is compromised more than for other people at the same age and educational level when their vision is blurred or when they are forced to read at a faster rate—even if they are fluent in English when tested for caption reading ability. Since there is much interest in using captioning to teach English to immigrant populations, the legibility and speed of the captions are basic factors to consider if captioning is to be a successful educational tool. In addition, this may be indicative of problems that face deaf people who have learned English as a second language.

* *As an Educational Tool.*

There is much interest in captioned television as a teaching tool for both children and for people who are learning English as a second language. When used in the classroom, many students must sit further from the television than they normally would at home. This makes the captions more difficult to read, especially for children. The distance from the television reduces the relative size of the text and studies have shown that children read best when the text is about two and a half times larger than that required by an adult for efficient reading. The EIA Television Data Subcommittee has recommended a system improvement that would allow the viewer to have some control over the size of the caption display. An option for size control would be an improvement over the present system but size is only one dimension that must be taken into consideration when designing more legible captions. In addition, written text relies primarily on lower-case letters in fonts similar to Roman Times. As a result, the captions now in use are a poor introduction to the written word.

Conclusions:

The population that needs captioning to understand television programs is indeed large, but many of these people have special needs that impede their ability to read and enjoy captions. The legibility and speed of the text are critical factors in designing a captioning system that is accessible to the greatest number of people. But the diversity of the hearing-impaired population is so great that no one standard can serve them all. The deaf leaders who advocated for closed captioning as well as many well-educated hearing-impaired people enjoy the present system, which basically provides unedited captioning and, without question, this should be maintained. However, the late-onset hearing-impaired elderly people comprise the vast majority of the hearing-impaired population (80%). Most of these people are not likely to enjoy reading captions presented at high rates. Therefore, a second channel, intelligently edited to reduce presentation rate, should be available to them. Most people who are prelingually deaf read at only the 4th-grade level by the time they graduate from high school. For them to enjoy captioning, a third channel edited for speed and vocabulary would be appropriate.

We urge the Commissioners to ensure that new generations of captioning technology be flexible enough to accommodate improvements in display parameters as research from our laboratory and others identifies a more appropriate text for closed captioning for different populations—text that has more legible spacing, common fonts and readily followed presentation rates.

To serve all hearing-impaired people, research is needed. But the FCC and the caption providers must also have the resolve to use this research to develop the caption channels and captioning services that bring most hearing-impaired people into the mainstream of communications technology.

Relevant References:

Publications

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2. Thorn, F. & Thorn, S., 1989, Speech reading with blurred vision: A problem of aging. *Journal of the Optical Society of America A*, 6, 491-499.
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Scientific Presentations

1. Thorn, S. & Thorn, F., 1987, Reading captions on television when vision is blurred. Paper presented at the World Congress of the World Federation of the Deaf, Helsinki, Finland.
2. Thorn, F. & Thorn, S., 1990, Television captions for the hearing impaired: A visual challenge for the elderly. Paper presented at the meeting of the American Academy of Optometry, Anaheim, CA.

3. Thorn, F., Thom, S. & Zieman, D., 1991, TV captions are difficult to read with small amounts of blur. Paper presented at the meeting of the American Academy of Optometry, New Orleans, LA.
4. Thorn, F. & Thom, S., 1992, TV captions may be too visually challenging for many hearing-impaired people. Paper presented at the meeting of the Eastern Psychological Association, Boston, MA.
5. Thorn, F., Thom, S. & Malley, D., 1994, Text speed, optical blur, refractive error and first language all affect the ability to read television text. Paper presented at the meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL.
6. Thorn, S. & Thorn, F., 1995, The elderly read TV captions as well as young adults. Paper presented at the meeting of the Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL.

Respectfully submitted by:



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28 February 1997



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